Calendar of Industrial Pioneers.

January 1, 1890. Horatio Allen died.—A pioneer among American locomotive engineers, Allen visited the Stockton and Darlington Railway in 1828, and afterwards conveyed to the United States the locomotive "The Stourbridge Lion." In 1871–73 he served as president of the American Society of Civil Engineers.

January 2, 1875. Eber Brock Ward died.—In 1864 Ward erected an experimental steel plant at Wyandotte, Michigan, where the first Bessemer steel made in the United States was produced. He was among the earliest to erect a works laboratory and to employ a works chemist. He also did important work in connection with water and rail transport.

January 3, 1795. Josiah Wedgwood died.—The friend of Watt, Erasmus Darwin, and Priestley, and a fellow of the Royal Society, Wedgwood by his experiments added several new species of pottery ware to English manufacture and turned the current of importation of the finer earthenwares into that of exportation. "He was the most successful and original potter the world has ever seen."

January 5, 1887. Sir Francis Bolton died.—The inventor of a system of signalling for the Army and Navy, Bolton was widely known for his electrical work, and he took a prominent part in founding the Society of Telegraph Engineers and Electricians, now the Institution of Electrical Engineers.

January 6, 1911. Sir John Aird died.—For sixty years Aird was engaged on important engineering schemes, his crowning work being the famous Assuan dam on the Nile built for the Egyptian Government in 1898–1902. The dam is 2200 yards long, it has 180 sluice-gates, and contains more than 1,000,000 tons of masonry.

January 6, 1886. Alhémar Jean Claude Barré de Saint Venant died.—Engaged for many years on practical work as an *ingénieur des ponts et chaussées,* Saint Venant was an eminent elastician, contributing much to the study of the strength of structures.

January 8, 1861. Samuel Clegg died.—A pupil of Dalton, Clegg while an apprentice at Birmingham witnessed Murdoch's experiments on gas lighting and himself became one of the pioneers of the gas industry.

January 8, 1825. Eli Whitney died.—Holding a pre-eminent place among the early inventors of America, Whitney, though originally a blacksmith, graduated at Yale, and while a private tutor in 1793 produced his cotton gin. This enabled one man to clean a thousand pounds of cotton a day instead of five or six pounds. In twelve years the export of cotton rose from 189,000 lb. to 4,000,000 lb. per annum.

January 9, 1843. William Hedley died.—With Trevithick, Stephenson, Blenkinsop, and Hackworth, Hedley was one of the pioneers of the locomotive. In 1813 at Wylam Colliery, near Newcastle, he built the "Puffing Billy," the first practical and efficient locomotive ever constructed. This engine is now in the Science Museum at South Kensington.

January 9, 1862. Samuel Colt died.—In 1835, at the age of twenty, Colt patented his repeating pistol or revolver, for the manufacture of which he built a factory where automatic and semi-automatic machinery was used.

January 11, 1877. Alfred Smee died.—Surgeon to the Bank of England, Smee was best known for his work on electricity. The Smee battery was devised by him, and he did pioneering work in electric metallurgy, including the art of electrotyping. E. C. S.

Societies and Academies.

Paris.

Academy of Sciences, December 19, 1921.—M. Georges Lemoine in the chair.—The president announced the death of M. Henry Parenty, correspondant for the section of mechanics.—E. **Borel**: The theory of games of chance and integral equations with symmetrical nucleus.—P. **Termier** and L. **Joleaud**: Summary of our knowledge of the Suzette layer (exact age, constitution, and extent): the question of its origin. This layer came from the Alps in the Aquitanian period, and is exclusively formed of Triassic elements.—C. **Richet**: The psychological unity of time.—G. **Gouy**: The surface tension of electrified electrolytes. In a recent communication M. Félix Michaud has proved that the surface tension of an electrolyte is not changed by the electrification of the surface, and hence raises an objection to the ionic hypothesis, since the ions, by accumulating at the electrified surface, should modify the capillary forces. The author states that it is not the ionic theory that is at fault, but the view that the charge is constituted by the ions accumulated at the surface. The latter hypothesis is inadmissible, since a small charge does not diminish the osmotic pressure in the interior of the electrolyte nor the total number of ions per unit of volume.—G. **Friedel** and L. **Royer**: Mixtures of anisotropic liquids and the identity of the stratified liquids of Grandjean with liquids of the azoxyphenetol type.—R. **Lagrange**: The absolute differential calculus.—J. **Wolff**: The series $\sum \frac{A_k}{z-a_k}$.—A. **Denjoy**: Quasi-analytical functions with real variable.—E. **Delassus**: Closed articulated chains.—H. **Abraham** and R. **Planiol**: An astronomical chronograph of precision. An auxiliary electrical clock, controlled by an astronomical clock, beats tenths and twentieths of a second, and these are marked on a smoked strip by a recording galvanometer; the same instrument records the observed times on the same strip, and an accuracy of 0·01 sec. (or greater if required) is readily attained by a direct reading without a micrometer.—J. P. **Lagrula**: The principle and scheme of a recording chronograph with geometrical synchronisation.—J. **Guillaume**: Observations of the sun made at the Lyons Observatory during the third quarter of 1921. Ninety days' observations are summarised in three tables, showing the number of spots, their distribution in latitude, and the distribution of the faculæ in latitude.—E. **Esclangon**: The relativity of time.—J. **Le Roux**: Interference and reflection in a mobile system.—J. **Chappuis** and M. **Hubert-Desprez**: Electrolysis by stray currents. Two metal plates forming the electrodes were placed in sawdust or earth moistened with an electrolyte contained in a wooden box. The course of the corrosion was followed continuously by X-ray photographs.—M. **Taffin**: The measurement of double refraction in tempered glass.—M. **Siegbahn**: New measurements of precision in the X-ray spectrum. A description of an improved instrument of a type described in 1918, capable of measuring a wave-length with an accuracy of 0·002 per cent.—A. **Sellerio**: Analogies and differences between the total galvanomagnetic effect and its correlative thermomagnetic effect.—J. **Duclaux**: The mechanism of continuous-light radiation.—B. **Bogitch**: The expansions of some refractory materials at high temperatures. Refractory bricks of silica, bauxite, clay, chromite, and magnesia and their expansions were studied up to 1500° C. Bauxite bricks had the lowest coefficient of expansion. Silica gave an irregular curve and lost its strength at about 600° C. The highest expansions were shown by magnesia and chromite bricks, and hence these are suitable only for furnaces in continuous work.—A. **Charriou**: The lime carried down by ferric hydroxide precipitates. To reduce the amount of lime adsorbed by precipitated ferric hydroxide to a minimum the calcium chloride solution should be very dilute and the ammonia added only just sufficient to precipitate the iron.—M. **Grandmougin**: The halogen derivatives of indigo.—J. B. **Senderens** and J. **Aboulenc**: The catalytic hydrogenation of the polyphenols in the wet way. Hydroquinone, resorcinol, pyrocatechol, pyrogallol, and phloroglucinol can be reduced in the presence of nickel by hydrogen under pressure (30 to 50 atmospheres) at temperatures between 115° C. and 145° C. At higher temperatures secondary reactions take place; thus resorcinol at 120° C. gives resorcite (1 : 3-*cyclo*hexanediol), but at 180° C. some *cyclo*hexanol is produced.—M. **Lespieau**: Derivatives of erythritol-acetylene,

$$CH_2(OH)\cdot CH(OH)\cdot C\equiv C\cdot CH(OH)\cdot CH_2(OH).$$

—R. **Fosse**: The synthesis of a nitrogenous principle of plants, hydrocyanic acid, by the oxidation of ammonia and carbohydrates, glycerol, or formaldehyde. Potassium (or calcium) permanganate, in presence of silver nitrate, with ammonia and various organic bodies, gives cyanides as one of the oxidation products. —C. **Jacob** and M. **Removille**: A fall of meteorites in Cochin China.—P. **Viennot**: The southern edge of the north Pyrenean Flysch, between the valleys of Aspe and Saison.—J. **Yung**: The Hercynian tectonic of the Vosges.—P. **Corbin**: New observations on the eastern border of the mountains of Lans.—Mlle. J. **Pfender**: The presence of pebbles not of local origin at Alon (Var).—E. **de Martonne**: Erosion platforms of the metalliferous mountains of Banat.—Mlle. Yvonne Boisse **de Black**: Researches on the Mindelian alluvium in the high valley of Cère and on the plateau of Lacapelle-Barrez (Cantal).—P. **Loisel** and R. **Castelnau**: The radio-activity of the waters from Mont-Dore. Determinations of the radio-activity of the water from twelve hot springs are given; the gases from eight springs have also been examined. The gases contain a higher proportion of radium emanation than the waters, and this proportion varies with the spring and with the date of collection.—A. **Boutaric**: The nocturnal radiation at Mont Blanc.—G. **Arnaud**: The affinities of the Erysiphæ and the Paradiopsidæ.—L. **Blaringhem**: Heredity and physiological characters in the hybrids of barley.—G. **André**: The transformations undergone by oranges on keeping. The ripening of oranges by keeping is due to a reduction of acidity, the loss of sugars being relatively small. These changes cannot be wholly due to oxidation, since they are produced in a vacuum. Diastatic action is suggested as possible.—P. **Dangeard**: The evolution of the aleurone grains in castor-oil seed during germination.—M. **Bridel** and Mlle. Marie **Braecke**: The presence of saccharose and aucubine in the seeds of *Melampyrum arvense*. Full details are given of the method of extracting saccharose and the glucoside aucubine from the seeds. Rhinanthine, extracted by Ludwig from the seeds of *Rhinanthus Crista-Galli*, was also stated by Ludwig and Müller to be present in the seeds of *Melampyrum arvense*. The identity of rhinanthine with aucubine has not yet been proved.—H. **Hérissey**: The biochemical synthesis of α-methyl-*d*-mannoside. By the action of the ferment present in germinated lucerne seeds upon *d*-mannose in dilute methyl alcohol solution, α-methyl-*d*-mannoside is formed. Details of method of isolation and proofs of identity are given. —A. **Demolon**: The sulphur-oxidising power of soils. —L. **Mercier**: The larva of *Limnophora aestuum*, a marine Diptera.—A. **Michel**: The interpretation of the profound histological differentiation of the dorsal elytra and cirrus of the Aphroditian Annelids.—J. L. **Lichtenstein**: The determination of egg deposition in *Habrocytus cionicida*.—L. **Roule**: The periodic changes of habitat of the common tunny fish (*Orcynus thynnus*) and their connection with the changes of medium. The migrations of the tunny fish are determined by the temperature and salinity.—L. **Léger** and E. **Hesse**: Microsporidia with spherical spores.—L. **Ravaz** and G. **Vergé**: The germination of the spores of vine mildew. Lime solutions are carbonated too rapidly on exposure to air to exert any toxic action on the mildew spores. Copper-lime mixtures resist the action of rain and dew and preserve their toxic power.—R. **Legroux** and J. **Jimenez**: The factor of growth in cultures of *Leishmania Donovani*.—G. **Bourguignon** and A. **Radovici**: Chronaxy of the sensitive rachidian nerves of the upper limb in man.—E. **Nicolas** and P. **Rinjard**: The vaccination of cattle against bovine plague.

Washington, D.C.

National Academy of Sciences, Proceedings, vol. 6, No. 11 (November, 1920).—A. **Weinstein**: Homologous genes and linear linkage in *Drosophila virilis*. A long and detailed study with numerous bibliographic references, not lending itself to recapitulation.—F. C. **Hoyt**: The intensities of X-rays of the L-series, III. Critical potentials of the platinum and tungsten lines. A continuation of an earlier work to the classification of some lines that were doubtful.—E. B. **Stouffer**: Semi-variants of a general system of linear homogeneous differential equations.—A. G. **Webster**: Some new methods in interior ballistics. A *résumé* of extended experiments on the principal problem of interior ballistics, namely, to determine the position and velocity of the shot, and the mean temperature and pressure of the gases in the gun. Graphical and analytical methods are used.—C. B. **Bridges**: The mutant crossveinless in *Drosophila melanogaster*. —J. A. **Detlefsen**: Is crossing over a function of distance? The author differs from the conclusion of many students of genetics, and believes that linkage is not a function of distance, that the distance between the two genes may remain fairly constant, and that the crossing over depends upon hereditary factors.—E. E. **Babcock** and J. L. **Collins**: Interspecific hybrids in Crepis. The behaviour of the seven-chromosome Crepis hybrid leads to the belief that there is not such a direct relationship between the two parent species as has been suggested.—C. G. **Abbot**: New observations on the variability of the sun. A discussion of an extended set of observations from July, 1919, to March, 1920, revealing a wide fluctuation in the sun's radiation.—L. P. **Eisenhart**: The permanent gravitational field in the Einstein theory.—G. A. **Linhart**: A simplified method for the statistical interpretation of experimental data.—C. B. **Lipman** and G. A. **Linhart**: A critical study of fertiliser experiments. From a statistical study of fertiliser experiments the authors conclude that no fertiliser experiment as ordinarily conducted is possessed of sufficient practical value to justify the large amount of money, time, and energy involved.

No. 12 (December, 1920).—H. **Shapley**: Preliminary report on pterergates in *Pogomyrmex Californicus*.—J. F. **McClendon**: Hydrogen-ion concentration of the contents of the small intestine. Criticism of the general erroneous impression that the intestinal contents are alkaline.—F. P. **Underhill** and M. **Ringer**: Blood concentration changes in influenza. Both physiologically and pathologically there is a marked resemblance between influenza and war-gas poisoning, with a marked increase in the concentration of the blood.—E. L. **Nichols** and D. T. **Wilbur**: Luminescence at high temperatures. Announcing the discovery of luminescence at temperatures which are, roughly speaking, above the beginnings of a visible red heat. —S. R. **Detwiler**: Functional regulations in animals with composite spinal cords. The evidence indicates that the factor which is involved in the over-production of motor cells is the stimulus afforded by the connection with the central neurones.—A. S. **King**: Experiments with the tube resistance furnace on the effect of potential difference. The conclusion is that the potential difference acting on the tube is not effective in modifying the spectrum in certain temperature ranges.—J. H. **McDonald**: An application of the porism of four tangents of a twisted cubic.—H. A. **Cheplin** and L. F. **Rettger**: Studies on the transformation of the intestinal flora, with special reference to the implantation of *Bacillus acidophilus*, II. Feeding experiments on man. Attempts to implant *Bacillus bulgaricus* failed, as in the feeding experiments on rats. It appears that *Bacillus acidophilus* milk possesses several advantages over ordinary sour and *Bacillus bulgaricus* milk.—Kilauea Volcano Observatory: A report by the committee of the National Academy of Sciences at the request of the Secretary of Agriculture with reference to desirability of the control of the observatory being assumed by the Weather Bureau.

Official Publications Received.

Legislative Document No. 39: State of New York. Thirty-second Annual Report of the New York State College of Agriculture at Cornell University and of the Agricultural Experiment Station established under the Direction of Cornell University, Ithaca, New York, 1919. Vol. 1. Pp. civ+1074+30+8+57 plates. Thirty-third Annual Report, 1920. Transmitted to the Legislature, January 15, 1921. Pp. 79+4. (Ithaca: Cornell University.)

Cornell University: Agricultural Experiment Station. Memoir 34: An Economic Study of Farm Layout. By W. T. Myers. Pp. 383-564. Memoir 35: Some Effects of Potassium Salts on Soils. By R. S. Smith. Pp. 565-606. Memoir 36: Resistance of the Roots of some Fruit Species to Low Temperature. By D. B. Carrick. Pp. 607-662. Memoir 37: A Modified Babcock Method for Determining Fat in Butter. By N. W. Hepburn. Pp. 663-690. (Ithaca: Cornell University.)

Department of Commerce: U.S. Coast and Geodetic Survey. Serial No. 113, Special Publication No. 60: A Study of Map Projections in General. By O. S. Adams. 5 cents. Serial No. 121, Special Publication No. 62: Triangulation in Rhode Island. By Earl Church. 30 cents. Serial No. 143, Special Publication No. 67: Latitude Developments Connected with Geodesy and Cartography. By O. S. Adams. 20 cents. Serial No. 146, Special Publication No. 68: Elements of Map Projection, with Applications to Map and Chart Construction. By C. H. Deetz and O. S. Adams. 50 cents. Serial No. 150, Special Publication No. 69: Modern Methods for Measuring the Intensity of Gravity. By C. H. Swick. Pp. 96. 15 cents. Serial No. 155: Results of Observations made at the U.S. Coast and Geodetic Survey Magnetic Observatory, near Tucson, Arizona. By D. L. Hazard. 20 cents. (Washington: Government Printing Office.)

Department of the Interior: United States Geological Survey. Water Supply Paper 449: Ground Water in the Meriden Area, Connecticut. By G. A. Waring. 466: Ground Water in the Southington-Granley Area, Connecticut. 468: Records of Water Levels in Wells in Southern Carolina. By F. C. Ebert. (Washington: Government Printing Office.)

Department of the Interior: United States Geological Survey. Bulletin 719: Preliminary Report on Petroleum in Alaska. By G. C. Martin. 50 cents. Bulletin 721: Geology and Petroleum Resources of North-Western Kern County, California. By W. A. English. 10 cents. Bulletin 715-M: Permiam Salt Deposits of the South-Central United States. By N. H. Darton. (Washington: Government Printing Office.)

Smithsonian Miscellaneous Collections. Vol. 72, No. 8: A Review of the Interrelationships of the Cetacea. By H. Winge. Translated by G. S. Miller, Jr. (Publication 2650.) Pp. ii+97. Vol. 72, No. 11: The Echinoderms as Aberrant Arthropods. By A. H. Clark. (Publication 2653.) Pp. ii+20. (Washington: Smithsonian Institution.)

Canada. Department of Mines: Mines Branch. The Preparation, Transportation, and Combustion of Powdered Coal. By J. Blizard. Pp. 131+3 plates. (Ottawa: Department of Public Printing and Stationery.)

Tide Tables for the Eastern Coasts of Canada for the Year 1922, including the River and Gulf of St. Lawrence, the Atlantic Coast, the Bay of Fundy, Northumberland and Cabot Straits, and Information on Currents. Issued by the Tidal Current Survey in the Department of the Naval Service of the Dominion of Canada. (Twenty-sixth Year of Issue.) Pp. 68. (Ottawa: Department of Public Printing and Stationery.)

Experiment Station of the Hawaiian Sugar Planters' Association. The Improvement of Plants through Bud Selection. By A. D. Shamel. Pp. iv+28+41 plates. (Honolulu.)

Madras Agricultural Department. Year Book, 1920-21. Pp. vi+123. (Madras: Director of Agriculture.) 10 annas.

Office scientifique et technique des Pêches Maritimes. Notes et Mémoires No. 8: Rapport sur la campagne de Pêche de l'Orvet dans les Eaux tunisiennes. Par Prof. G. Pruvot. Pp. 12+1 map. 3 francs. Notes et Mémoires No. 9: Recherches sur le Régime des Eaux Atlantiques, au large des Côtes de France et sur la Biologie du Thon Blanc ou Germon (Observations faites pendant la seconde croisière de la Tanche, Août et Septembre, 1921). Par Ed. le Danois. Pp. 16+6 plates. 4 francs. (Paris: Ed. Blondel la Rougery.)

Department of the Interior: United States Geological Survey. Professional Paper 121: Helium-bearing Natural Gas. By G. S. Rogers. Pp. 113. (Washington: Government Printing Office.)

Departement van Landbouw, Lijverheid en Handel. "'S Lands Plantentium." (Jardin Botanique de Buitenzorg.) Treubia: Receuil de Travaux Zoologiques, Hydrobiologiques et Oceanographiques. Vol. 1, Livraison 4. Pp. 139-300+plates 8-12. (Buitenzorg.) 4 francs.

The Botanical Society and Exchange Club of the British Isles. (Vol. 6, Part 1.) Report for 1920. By the Secretary, G. C. Druce. Pp. 207. (Oxford: The Secretary. Yardley Lodge.) 10*s*.

Fourteenth Annual Report (1920-21) presented by the Council to the Court of Governors at a Meeting held in Cardiff on October 28, 1921. Pp. 35. (Cardiff: The Museum.)

Canada. Department of Mines: Mines Branch. Bulletin No. 33: Gas Producer Trials with Alberta Coals. By J. Blizard and E. S. Malloch. (Supplementing Report No. 331.) Pp. 40. (Ottawa: Department of Public Printing and Stationery.)

Department of Scientific and Industrial Research. Building Research Board. Special Report No. 2: Experiments on Floors. An Extract from the Report of the Building Materials Research Committee. Pp. 21. 1*s*. 3*d*. net. Special Report No. 3: The Stability of Thin Walls. An Extract from the Report of the Building Materials Research Committee. Pp. 13. 6*d*. net. Fuel Research Board. Fuel for Motor Transport. Second Memorandum by the Fuel Research Board. Pp. iv+16. 6*d*. net. (London: H.M. Stationery Office.)

Mines Department: Miners' Lamps Committee. Memorandum No. 4: Record of Research on the Passage of Flame through Perforated Plates and through Tubes of Small Diameter. Pp. 19. 9*d*. net. Memorandum No. 5: Record of Research on the Passage of the Flame of an Explosion from within Miners' Lamps fitted with Chimneys. Pp. 13. 6*d*. net. (London: H.M. Stationery Office.)

Department of Commerce. Scientific Papers of the Bureau of Standards, No. 421: Wave Lengths longer than 5500A in the Arc Spectra of Yttrium, Lanthanum, and Cerium, and the Preparation of Pure and Rare Earth Elements. By C. C. Kiess and others. Pp. 315-352. (Washington: Government Printing Office.) 5 cents.

Union of South Africa. Department of Mines and Industries: Geological Survey. Sheet 52: Johannesburg. (Pretoria: Geological Survey.)

Proceedings of the Royal Irish Academy. Vol. 36, Section A, No. 1: On Polygons to Generate Diagrams of Max. Stress on Girders due to Locomotives and Dead Loads, together with an Extension of Rankine's Conjugate Load Areas to the Design of Masonry Arches. By T. Alexander and J. T. Jackson. Pp. ii+30. (Dublin: Hodges, Figgis & Co.; London: Williams and Norgate.) 1*s*.

Proceedings of the Geologists' Association. Vol. 33, Part 1. Pp. 80+4 plates. (London: E. Stanford, Ltd.) 5*s*. net.

Agricultural Research Institute, Pusa. Bulletin No. 117: Experiments with Castor Seed conducted at Sabour. By C. S. Taylor. Pp. ii+10. 3 annas. No. 119: The Agricultural Development of Baluchistan. By A. Howard and G. L. C. Howard. Pp. iv+27. 6 annas. No. 122: Pusa 12 and Pusa 4 in the Central Circle of the United Provinces. By B. C. Burt and others. Pp. iv+34. 11 annas. No. 124: Safflower Oil. By A. Howard and J. S. Remington. Pp. ii+14. 4 annas. (Calcutta: Government Printing Office.)

Diary of Societies.

THURSDAY, JANUARY 5.

GEOGRAPHICAL ASSOCIATION (at Birkbeck College), at 11.45 a.m.—R. L. Thompson and others: Discussion: Geography and History in Schools.

ASSOCIATION OF ASSISTANT MASTERS IN SECONDARY SCHOOLS (at London Day Training College), at 2.30.—Prof. T. P. Nunn: The Purposes of Education.

GEOGRAPHICAL ASSOCIATION (at Birkbeck College), at 2.30.—Sir Halford J. Mackinder: Problems of the Pacific.

ROYAL INSTITUTION, at 3.—Prof. J. A. Fleming: Electric Waves and Wireless Telephony: Electric Oscillations.

GEOGRAPHICAL ASSOCIATION (at Birkbeck College), at 4.—E. N. Fallaize: The Anthropological Institute and the Services it can render to Geographical Students.